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ABSTRACT

This report addressed to policy making officials in local government deals with the role of federal assistance in future developments of information systems by local governments through an assessment of the Urban Information Systems Inter-Agency Committee (USAC) Program, which, beginning in 1970, provided grants to five municipalities--Charlotte, North Carolina; Dayton, Ohio; Long Beach, California; Wichita Falls, Texas; and Reading, Pennsylvania--to develop integrated, computer-based information systems. Recognizing the different management needs of government, these systems automate selected municipal functions, mostly in the area of delivery of services, and provide data for management decision making. An assessment of the program in 1974 indicated that, in general, the USAC Program, although it had significant impact on the development of information systems, had not met some stated objectives, due to underestimated cost and complexity of systems development within a limited time frame. This led to an examination of cost and benefit relationships of information systems and the transferability of systems or components. The program contributed a body of knowledge about how to approach the development of information systems, stressing the importance of involving elected and appointed officials in that process, and pioneered the application of computer technology in municipal functions. Since few governments have resolved the privacy issue, this and some related issues are also discussed. (CWM)

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Local Government Information Systems — A Study of USAC and the Future Application of Computer Technology

A Report by the
Urban Information Systems Inter-Agency Committee
(USAC) Support Panel
of the
Assembly of Engineering
National Research Council

NATIONAL ACADEMY OF SCIENCES
WASHINGTON, D.C. 1976

NOTICE

The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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The panel members wish to recognize the hospitable reception accorded them during visits to the cities in the USAC Program: Wichita Falls, Texas; Dayton, Ohio; Long Beach, California; Reading, Pennsylvania; and Charlotte, North Carolina. Mayors, city managers, department heads, and their expert assistants--too numerous to list here---made the panel members feel welcome. They greatly assisted our task by being open and frank in their responses, even to our most probing questions.

In addition, the panel members want to thank officials in non-USAC local governments that were visited: Albuquerque, New Mexico; Chattanooga, Tennessee; Cincinnati, Ohio; Fairfax County, Virginia; Fresno, California; Kansas City, Kansas; Lane County, Oregon; and the ten municipalities in the Minneapolis-St. Paul Metropolitan area that belong to the Local Government Information System (LOGIS).

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Richard P. Gifford
Chairman, USAC Support Panel

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Summary

Computer technology has become widespread in the operation of local government in recent years. A 1975 survey found that more than 90 percent of cities with populations over 50,000 and counties over 100,000 were using electronic data processing in some form. The computer can store, manipulate, and retrieve a variety of data elements simultaneously from multiple sources for multiple functions. Yet local governments have used computers mainly for the routine processing of basic functions that are increasingly costly and impractical with manual procedures. Computer technology has not been used to any great extent to streamline a variety of local government operations and to aggregate data needed to improve management decision making.

Ten federal agencies formed the Urban Information Systems Inter-Agency Committee (USAC)* in 1968 in an effort to advance the application of computer technology among local governments. The USAC Program, which began in 1970, provided grants to six municipalities to develop integrated, computer-based information systems that would automate selected municipal functions--mostly in the rapidly growing area of delivery of services--and, as a by-product, provide data for management decision making.

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*The Department of Housing and Urban Development, Transportation, Health, Education and Welfare, Labor, Commerce, Justice, the Bureau of the Budget (now the Office of Management and Budget), the Office of Economic Opportunity, the Office of Civil Defense (now the Defense Civil Preparedness Agency) in the Department of the Army, and the National Science Foundation.

As the funding of USAC was nearing an end, (federal financial assistance was terminated on June 30, 1975), the Department of Housing and Urban Development (HUD), the lead member of the USAC consortium, requested the National Research Council to establish a panel to assess the results of the program.

The USAC Support Panel spent one year visiting and talking with officials in the USAC cities** and other local governments that have similar systems.

In general, the panel found that the USAC Program, although it has had a significant impact on the development of information systems among local governments, had not met some of its stated objectives. The program has contributed a body of knowledge about how to approach the development of information systems, has demonstrated the importance of involving elected and appointed officials in the development process, and has pioneered in the application of computer technology to a wide variety of municipal functions.

Nevertheless, the program failed to meet some of its objectives because USAC underestimated the cost and complexity of developing an extensive integrated information system within a limited time frame. The USAC concept imposed too much too quickly. The program demonstrated that integrated information systems in local government should be developed incrementally over an extended period of time.

The USAC Program, however, did identify a number of important principles that need to be adopted by local governments in developing an integrated information system. The principles include, but are not limited to: the need for an effective management structure that assures the involvement of top management in systems development, involving department heads and other key users of the system during all phases of development, and a long-range plan to guide the development process.

Among the specific elements that the panel examined in the USAC Program were the cost and benefit relationships of information systems, and whether the systems, or the components within any system can be transferred from one local government to another. In terms of costs and benefits, the USAC Program yielded little data, largely because of its research and development thrust. Costs can be estimated fairly accurately, but quantifying the particular benefits has proved difficult because benefits often are viewed subjectively.

The transfer of workable concepts, proven programs, or even groups of programs, is a viable approach to develop information systems, although more needs to be known about the process for making transfers. The number of transfers that have taken place are few, but the technique is likely to be used more frequently in the years ahead,

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**The USAC cities are: Charlotte, North Carolina; Dayton, Ohio; Long Beach, California; Wichita Falls, Texas; and Reading, Pennsylvania. A sixth city, St. Paul, Minnesota, dropped out of the USAC Program.

largely because of the savings in development costs.

The panel also examined the implications manifested in the change from manual record keeping to computerized record systems on personal privacy, data confidentiality, data access, and computer security. Although most local governments have not adequately addressed the problems of personal privacy, the panel found that two cities--Charlotte, North Carolina, and Wichita Falls, Texas--have enacted local ordinances which govern the access to and confidentiality of sensitive personal data. The panel also noted that local governments faced conflicting and unresolved concerns when the privacy issue is juxtaposed with the openness required of a public body. The basic elements necessary for a plan to address privacy and related issues by local governments are discussed in this report.

RECOMMENDATIONS

1. An information systems resource center* needs to be established to provide information about the application of computer technology and to offer general assistance in the development of information systems.
2. This center should have the capability to convene seminars and workshops on the uses of information systems in local government and to offer general assistance in the development of information systems.
3. An education program should be developed to provide a better understanding of the technical and managerial aspects of computer-based information systems in local government.
4. A series of documented and monitored experiments in the transfer of computer technology should be undertaken to identify the processes that underlie the successful transfer of information system programs and components.
5. An analysis of data processing applications should be undertaken to define better methods of determining the cost/benefit relationships of computer-based information systems.
6. The center should be capable of developing background information on mechanisms available to local governments for dealing with the issues of data access and privacy.

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*The concept---of an information systems resource center---appears frequently in several of the recommendations here. In completing its initial draft of the report, the panel was asked by the Department of Housing and Urban Development to describe more completely the alternatives for the mission, organization, operation, and funding of an Information Systems Resource Center. The panel's preliminary conclusions, which are based on the findings of this study and the perceived trend toward less federal control, are that the center should be controlled by local governments and should strive for self-sufficient financing. The panel's final conclusions and recommendations regarding the proposed center will be the subject of a later report.

7. The federal and state governments should establish an incentive program for intergovernmental cooperation in conjunction with the use of federal resources to develop or improve information systems.

CHAPTER 1

Introduction

This report culminates one year of work in assessing the Urban Information Systems Inter-Agency Committee (USAC) Program.

At the request of the Department of Housing and Urban Development (HUD), the lead agency for interagency and contract coordination in the USAC Program, a USAC Support Panel was created in July 1974, to assess the program. The multi-disciplinary panel was constituted under the Committee on Telecommunications of the National Research Council, the principal operating agency of the National Academy of Sciences and the National Academy of Engineering.

The report deals with the role federal assistance can take in the future developments of information systems by local governments. It primarily addresses the mayors, council members, county commissioners, city and county managers, and policy-making officials in local government.

One feature of this report is a digest of lessons learned from the USAC experience that the panel believes will be useful to local government officials in deciding what action to take in developing or improving existing information systems through the application of computer technology.

This is not a technical report, although some computer jargon is used out of necessity. On the whole, however, the panel has assiduously avoided the use of technical terms and references. Neither is the report a "how-to-do-it" guide. The intent of the report is to convey to local government executives and managers, who may not have technical backgrounds and may be apprehensive about computer technology, a synoptic presentation of the panel's assessment of the USAC Program. Based on what was learned in talking with officials in the USAC and non-USAC cities and on the individual expertise of the panelists, the report draws some general conclusions on the factors that are considered essential to information system development. It also details some of the experience encountered by the cities through trial and error, sometimes with painfully instructive consequences.

The non-technical approach in preparing this report grew out of a series of discussions between the panel members and HUD officials

regarding the panel's task. The HUD officials stated that the most useful report would interpret for local government executives unfamiliar with computer technology the intent of the USAC Program and provide a summary of the principles and experiences that had emerged from the federally-sponsored demonstration program.

Therefore, for those persons who have followed the program closely, particularly its technical aspects, this report will not add significantly to what has already been written. Many documents dealing with the technical phase of the program were prepared by the USAC cities to fulfill the program requirements. Most of those documents are available through the National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, Va. 22161. Abstracts of 210 USAC reports are available under the bibliographic reference, "Urban Information Systems, Part II, USAC Reports." The number is NTIS/PS-75/624, and the cost of the USAC abstract is $25. HUD has published an "Index to Municipal Information Systems Publications" which lists documents that are available through NTIS and the price of each document. The index can be obtained by writing HUD, 451 Seventh Street, S.W., Washington, D.C. 20410. In addition, many consultants and local government organizations have studied, or in other ways contributed to the USAC Program, and some of their findings are also available through NTIS.

CHAPTER 2

The Origins of USAC

Early in 1968, officials in the Department of Housing and Urban Development (HUD), met with representatives of other federal agencies concerned with the development of urban information systems. These discussions led to an agreement to create a federal mechanism to support the development of urban information systems for local governments.

On September 10, 1968, the Secretary of HUD, with the concurrence of other interested Federal agencies, created the Urban Information Systems Inter-Agency Committee (USAC). USAC was to encourage and recommend "fiscal support for municipal information systems research and development efforts from Federal agencies involved, supplemented by resources from municipalities and other sources." The program's primary objective, as stated in the Request for Proposal (RFP), was "to create a capability for combining the greatly increased human, material, and financial resources together with the most recent level of technological development of computer-based information systems." The purpose was "to stimulate the development of urban information systems by several orders of magnitude over the past."

The stated objectives of USAC were:

To improve the decision-making capabilities of municipalities.

To foster research and development on a broad scale, looking at issues such as data standardization, confidentiality of data, and the implication of information systems on administrative organizations.

To insure that information systems were based on data generated by existing municipal operations.

To develop solutions to the problem of technology transfer among municipalities with differing methods and practices.

On July 31, 1969, USAC issued an RFP, inviting responses on two levels. One was for an integrated municipal information system

(IMIS)* commonly referred to as a "total" system. The other was for a series of integrated subsystems, e.g., public safety, human resources development, physical and economic development, and public finance. According to the RFP:

> The subsystem would normally involve the functional integration of the information requirements of two or more departments in the administrative structure of the municipality; that is, the information requirements of departments sharing responsibility for the satisfaction of a particular function would be integrated into a subsystem. The integration of the information subsystems, covering all of the functions of the municipality, would constitute an integrated municipal information system.

In a cover letter accompanying the RFP, USAC estimated that "an effort within a cost range of $2 million to $3 million to be appropriate cost over a maximum period of three years for development of an integrated municipal information system; and a cost range of $300,000 to $500,000 to be an appropriate cost over a maximum period of two years for development of a functional (sub) system."

Invitations to respond to the RFP were sent to all 359 municipalities in the target population group (50,000 to 500,000) eligible for the program. A total of 79 cities submitted 99 proposals.

After extensive review, six proposals were officially accepted by USAC in March 1970. Awards went to Charlotte, North Carolina, and Wichita Falls, Texas, to develop integrated municipal information systems. Awards for integrated subsystems went to Dayton, Ohio, for public finance; Long Beach, California, for public safety; Reading, Pennsylvania, physical and economic development; and St. Paul, Minnesota, human resources development.

Each of the six cities were directed to develop computer-based information systems in five phases: (1) analysis of existing city processes; (2) conceptualization of an integrated system; (3) systems design; (4) development, which included programming, and testing; and (5) implementation.

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* A computer-based integrated municipal information system (IMIS) is a system in which ideally all the major functions and sub-functions of urban government are, by plan, built upon shared data bases. The data bases relate to people, property, and money and thereby provide urban officials with the capability to deal with the interlocking relationships that exist in the management of municipal government. This concept is discussed further in Chapter III.

USAC terminated the St. Paul project in September 1971, and provided for a contract extension to May 1972, to complete the project documentation.* The project termination resulted, at least in part, from the inherent difficulty encountered by St. Paul in developing an information system for human resources, which included such services as manpower, health, welfare, education, and recreation. These services are provided by a wide variety of city, county, state, and private agencies. Thus, for a single municipality to attempt, as St. Paul did, to develop a comprehensive, integrated information subsystem to cover a complex and fragmented array of services, most of which it did not control, was practically impossible. For similar reasons, the two other USAC cities that received grants for total information systems were unable to develop human resources subsystems.

Overall, $26 million was spent on the USAC Program over the five-year span of its research and development. Of this, the federal agencies contributed $20 million, and the six municipalities the remainder. Among the federal agencies, HUD contributed the most, $11.2 million, and HEW next with $4.8 million.

+This documentation includes: "Human Resources Development Subsystem, Final Project Evaluation Report", University of Minnesota, March 1972; "Human Resources Development Subsystem, Final Project Report," City of St. Paul and Aries Corporation, May 1972; and David Hines, "St. Paul: Anatomy of a Failure," Clarement College California,1972.

CHAPTER 3

Management Needs of Local Government

"It is no exaggeration to state that the computer has probably contributed more to our current management development than has any other single entity."-Terry, "Principles of Management" (1)

As late as the 1940's and 1950's, most municipal governments still limited their activities to traditional functions, such as police and fire protection, cleaning and repairing streets, and collecting garbage. During this period and continuing into the 1960's, a number of things occurred that applied increasing pressure to local governments and strained the ability of officials to respond to the needs of the people being served. By 1970, for example, population patterns had changed to the point where three out of four Americans lived in urban settings. Meanwhile, the inner cities of the larger urban areas were deteriorating as people and businesses moved to suburban areas. In addition, increased social awareness brought demands to alleviate poverty, reduce crime, and eliminate air and water pollution. Citizens also wanted better transportation and, with more leisure time available, they wanted additional recreational facilities and programs.

These types of demands have placed an enormous burden on local governments. The magnitude and quality of services sought from local government have increase so dramatically that local officials have been hard pressed to respond.

In the face of the growing burden, local government is increasingly required to construct a systems approach to improve the management of the service delivery function and, at the same time, make the best use of limited resources. Stated differently, local government officials responsible for planning and administering service functions need to consider service operations in a broad, systematic way. The systems approach in industry, according to Joel Ross, Professor of Management at Florida Atlantic University, "is designed to utilize scientific analysis for (a) developing and managing operating systems and (b) designing information systems for decision making." (2) The same applies to local government officials who perceive the need to respond to the range of services that should be provided to meet identified needs, to determine what the cost will be, and to estimate

the effect programs and services will have on meeting the needs.

The result is that local governments recognize that to carry out effectively the increased service delivery role in a complex environment, swirling with interrelated forces, required a much greater degree of management sophistication. Basic to such an approach is a flow of information on which priorities can be set and alternatives considered in the decision-making process. Equally important is feedback from which determinations can be made on whether further changes or adjustments are necessary.

Thus, USAC sought to advance the application of computer technology in local government beyond merely performing manual functions more quickly. The ultimate goal was to design an information system capable of improving overall management and decision-making.

CHAPTER 4

What Was Learned in General from USAC

BUILDING AN INTEGRATED MUNICIPAL DATA BASE

Potential applications of electronic data processing (EDP) in local government range from the mechanization of the most elementary repetitive tasks, at one extreme, to the organization and display of vast quantities of varied data in support of planning, at the other. Almost in a class by itself is the combined organization and management of substantially all factual data in the files of local government in a common "integrated" data base for the support of every department and function.

Nearly every local government or industry which has employed EDP technology has, at one time or another, faced the question of how much integration in the data base can be justified by administrative, social, and economic benefits. The development and maintenance of an integrated data base can be expensive, compared to a manual system, although integrated systems obviously can perform many functions manual systems cannot. The achievement of benefits sufficient to justify the cost depends upon the use of the data wherever applicable within local government. This, in turn, may require new methods, new interdepartmental arrangements and working relationships, and perhaps even new objectives not previously foreseen or considered important to justify the tax expenditures for their achievement.

Historically, in both local government and industry, EDP applications have begun with the simple automation of repetitive tasks. These applications have progressed through stages to the automation of many repetitive tasks for development of routine reports and displays of value to administrators and planners.

As more tasks are automated and more reports are requested, some data required for two or more purposes will be included in two or more data files. Moreover, nearly all such data alters with time. Therefore, it is increasingly difficult to maintain up-to-date files that are consistent.

One solution to this problem--and a fundamental principle required in the USAC approach--is to develop an integrated data base wherein data redundancy is minimized and data elements can be linked together for use by various governmental departments. A municipal data processing system employing an integrated data base, in USAC terminology, is an Integrated Municipal Information System. (IMIS)

DATA INTEGRATION

The panel recognized that some confusion exists over the meaning of the word "integrated". The confusion stems from the varying degrees to which data duplication can be minimized and the data from different governmental departments or functions can be linked in an interactive, interdependent way. The mere availability of a computer does not predestine the existence of a computerized information system. The threshold for an integrated system is the point at which data elements from two or more separate functions, such as payroll and accounting, are shared or linked together for the common benefit of those using the data. For example, an integrated system is possible without achieving a level of development that includes an integrated data base.

Looking at the definitional problem another way, the two USAC cities that are developing total systems both possess integrated data bases, but the development has not yet achieved the level of integration envisioned by the USAC Program. Thus, these systems are called integrated systems, although by USAC standards they have not yet reached that point.

MUNICIPAL USE OF COMPUTERS

The use of computer technology by local governments is widespread. A recent survey found that more than 90 percent of cities with population of over 50,000 and counties with over 100,000 were using electronic data processing in some form. (3) A total of 78 percent had their own computer. This survey also showed that the total amount spent on data processing by cities and counties was more than $500 million a year, or on the average, between 1 percent and 2 percent of their operating budgets. Not unexpectedly, the survey found that the most common application of computer technology was for financial administration. The only non-financial application in the top seven uses was for police service. The functions, in the order of frequency, were: 1) accounting; 2) police-sheriff; 3) treasury and collections; 4) utilities; 5) budget and management; 6) personnel, and 7) purchasing.

The extent to which USAC stimulated the widespread use of computer technology is speculative. The panel members found in visits to non-USAC cities, however, that familiarity with the program was commonplace. Although some officials had only read materials about USAC, a vast majority had been to USAC-sponsored meetings, talked with personnel from USAC cities, or visited one or more of the

development projects. Those interviewed said they had learned from the USAC experience and had used that knowledge in their operation of local government.

THE CONTRIBUTIONS OF USAC

In terms of its most ambitious undertaking--establishing integrated systems--the USAC Program fell short of meeting some goals and objectives set out in the beginning. Primarily, this was the result of a gross underestimate of the nature, the complexity, and the cost that USAC set for the program. For example, constructing an integrated data base at the level required by USAC proved far more complex and time-consuming than had been anticipated.

Nevertheless, the value of USAC, should not be judged on the inability of the program to meet certain narrowly defined objectives. Because of its research and development nature, it was a high risk venture in which not every part was expected to succeed. An important value of USAC lies in the pervasive impact it already has had in spreading knowledge among local governments on the use of information systems. Charlotte is a good example of the program's ripple effect. During the USAC Program, Charlotte officials explained the program at 18 governmental or technical conferences across the country and received visits from 67 different groups, mostly local governments, that came to discuss the Charlotte system. Some groups visited the project several times. Other USAC cities had similar experiences.

The panel concludes, therefore, that the USAC Program has encouraged the growth of a body of knowledge that has contributed significantly to the development of information systems in local government.

The USAC experience in building an integrated system illustrates the point. The types of data processing systems that have evolved in local government over the years can be categorized as independent or functionally-oriented systems. Although these systems have assisted the performance or management of specific functions, such as utility billings or printing paychecks, they have generally failed to support the growing need of general purpose local governments to plan, manage, and coordinate increasingly complex and interrelated urban services.

A potential solution to this important problem---one that was central to the USAC research and development program---is the synthesis of functional systems into an integrated system. In placing a heavy emphasis on data integration, USAC wanted to develop systems that would be more responsive to the management needs of local officials. In so doing, however, the USAC Program ran into some unanticipated difficulties, such as the complexity of building an extensive data base. As a result of the problems encountered, the USAC experience has shown that integration, although desirable and beneficial, should be balanced against other important considerations, such as the time and skills required to develop a system, the readiness of local government officials to use the system, the costs involved, and the benefits expected. Thus, the USAC approach to the development of an integrated

system has significantly increased the perception of how local governments should approach the design and implementation of information systems to achieve the best overall results for management assistance.

The USAC Program also sought to expand computer applications for a wider range of municipal functions. For example, the program attempted to show that data generated by building permits, building inspections, and other related functions could be aggregated to assist fire fighting and fire prevention operations. In carrying out these pioneering efforts, the program demonstrated that a wide range of municipal functions could be adapted to the computer.

Finally, another major impact of the program has been to show the importance of involving top managers and elected officials in the development of an information system. This subject will be discussed more fully in the next chapter.

CHAPTER 5

Information Systems Development

ALTERNATIVE APPROACHES TO ACQUIRING COMPUTER CAPABILITY

Local governments can acquire computer-driven information systems in several ways. The method utilized thus far by most local governments has been to develop the system internally with existing staff supported by equipment manufacturers or technical consultants.

A second method, which appears to be gaining followers, is to transfer an existing system from another local government and modify the computer program to meet the requirements of the recipient government. (Because technology transfer was a major element in the USAC Program, the subject of systems transfer will be discussed more fully in Chapter 7.)

These two methods, of course, have been used successfully in combination. Some local governments have developed basic systems and later transferred components from other local governments to further develop their system.

Others--few in number--have taken the opposite approach. They began with the transfer of a basic system, such as payroll and finance, and later expanded through internal development efforts.

Another method which holds promise for smaller cities was developed in the Minneapolis-St. Paul metropolitan area where 10 suburban cities--all under 50,000 population-- have joined together through a joint powers agreement to share a computer-based information system. In a slightly different arrangement, 16 cities in 3 California counties in the San Gabriel Valley share a computer facility.

The panel believes that USAC demonstrated some fundamental principles that should be adhered to by local governments in the planning and development of information systems, regardless of how the computer capability is acquired. The formulation of such systems is a long-term, essentially unending process. The reasons for protracted development are the result of many variables. The information needs of a local government, for example, are likely to change over time as the functions of government change. Similarly, the staff capability and understanding of what can be achieved are likely to increase over the long term. Finally, computer technology and the sophisticated software that drives computer systems are being improved at a dizzying pace.

The rapidly declining cost of computer hardware illustrates this change. According to computer industry officials (4), the hardware cost per unit computation decreased by more than 1,000 times in the past 10 years, a factor of 2 each year. This trend is projected to continue for some years.

Moreover, little is known about the effect that minicomputers and microcomputers will have on the future development of information systems. Predictions by those experienced in data processing technology are that they will have a profound influence.

Thus, the recognition by local officials of the need for an information system and the acquisition of some type of computer capability to provide such a system are but beginning points along a continuum. The principles set out below, which are based on the experience of officials in the USAC cities, are offered as guidance to other local government officials as they move along the continuum.

KEY FACTORS IN INFORMATION SYSTEM DEVELOPMENT

Management Concerns

Much of the success of an information system depends on the capability and structure of the management process which the system is designed to assist. The more complicated and sophisticated the information system is, or becomes, the greater the demand for management capability. Writing about this problem in industry, Ross states that: (5)

> many organizations and managers make the basic mistake of thinking that a management information system can be designed or made operational without the backup of an adequate management system. An adequate management system includes the organizational arrangements, the structure and procedures for adequate planning and control, the clear establishment of objectives, and all the other manifestations of good organization and management.

USAC has demonstrated that the same applies to local government. City officials interviewed by the panel indicated that not enough attention had been given to management concerns. These concerns include identifying the strategic parts of the system, understanding their mutual dependency, and identifying the processes which link the parts together, or facilitate their adjustment to each other.

Charlotte officials explained, in a summary report of their USAC project, that they have taken great care in determining the sequence of implementation for the 70 or so modules defined for the total system.

> As it turns out, there are probably only a very few key modules which should be operational before any of the others. These key modules fall in the geographic base file, the finance, and the personnel areas. . .once the key system modules are implemented, other system work can go on primarily in light of user priorities. This method of sequencing is especially appropriate since increasing system integration will occur on a practical basis as much through opportunistic evolution as it will through careful planning. (6)

At various points in the USAC Program, Dayton, Charlotte, and Wichita Falls adopted somewhat similar approaches to overcome management problems. In each case, an internal management support group was established which reported directly to the city manager. The support group generally consisted of the city manager, data processing personnel, and department heads who were or would be users of the information system. The support group provided a valuable synergistic communication link in tackling interdepartmental management problems and establishing priorities for system development.

The need for good management practices and the involvement of management in developing information systems cannot be overemphasized. Perhaps the most consistent response the panel members heard on the site visits was that top management--mayors, county executives, city managers, chief administrative officers---should be committed to the system, should be responsive to the need for change, and should be involved in major decisions affecting the system. The absence of management commitment and involvement opens the door to a number of problems, including a system that is technically proficient, but only of marginal value for operations requirements or management decision-making needs.

Fresno, California, recently acquired by transfer the components of the Dayton Financial Management System. In a paper describing the transfer, Don Nolan, a management analyst in Fresno, stressed the importance of top management taking an active role in development of the system. He said: (7)

> The greater the direct interest, support, and attention given this activity by management, the more information systems improvement will be used by the organization.
>
> The management (of a project). . . should be established at the top management level because the policies, procedures, and directions must be approved by those in control. The types of information that the system can generate should be known by management in order to get the highest return on the investment. Thus,

a properly informed management can clearly define problems, develop and review acceptable alternatives, select resolutions, and implement.

In other words, management must not delude itself into thinking problems will be solved because the project is turned over to the systems experts. Management must get itself involved and take the responsibility of the system development processes for the city. Only in this way can designated objectives be achieved.

Another way of stating the point is: "Management must learn to control the computer or the computer will control it." (8)

User Involvement

o The need for line department managers and operating staff to be involved in all stages of development of the components they will use in the information system was expressed repeatedly by local officials to panel members. When a computer application is implemented, it usually affects some existing departmental procedure. The conversion from one procedure to another entails risks of failure or temporary disruptions in operations. The acceptance of those risks is the responsibility of the line department, not the data processing division. When the user department is satisfied that the new procedure is ready, the change can be made. Similarily, improvements to existing procedures, although they may be suggested by anyone, must be evaluated by the user department, and the decision to proceed or not to proceed should rest with the user. As has been demonstrated time and again, failure to observe this fundamental principle can lead to management problems.

The development of computer-based systems involves several important precepts of management. They are:

o The creation of a system must be perceived and managed as a development process in the system engineering sense of the phrase. Development process starts with a careful statement of the needs of the eventual users. This entails a thorough and detailed examination of the existing information processes and flows in the organization. The statement of needs is followed by a careful validation of those needs against technical feasibility and an orderly and carefully managed design-development phase. Finally, the complete product must be thoroughly tested against its functional design specifications and then against the needs and experiences of the users.

o Although users should be involved with the statement of requirements, they must not be allowed to obstruct the design-development phase. Since adjustment of specifications and even

compromise are likely to occur during the development phase the end user must stay involved, but in a carefully controlled fashion--often referred to as configuration control or change control. In particular, the end user cannot be allowed to capriciously inject continually changing requirements.

o The development process must be managed, including following carefully drawn schedules and milestones, documenting specifications and end products, providing a change control mechanism, and specifying a list of deliverable end products.

The USAC experience showed that circumstances may arise which tend to negate involvement. Listed below are some of the problems that USAC cities encountered.

o Line department personnel who do not have technical skills may be apathetic, suspicious, or even resistant to the introduction of computer technology. A tendency in such cases is for technical personnel to design and develop the system with little or no involvement of the user department. This is not a solution to the problem, and it should be avoided. If the user who faces the risk does not have confidence in the system, for whatever reasons, the chances of its success are limited. Reluctance of a department to participate is a management problem and should be addressed as such. At least one USAC city used success as a means of persuasion. It chose the department most ready to participate as the starting point. The successful results were then used to encourage other departments to join.

o A key person in the line department may be unable to devote the necessary amount of time to development activities. Ideally, a department head or an immediate subordinate should work closely with data processing technicians to analyze the task, develop the conceptual model, approve the design, and participate in implementation. This may pose a problem for the department official who must meet departmental responsibilities while simultaneously devoting time to systems development. To the extent the latter is neglected, the final product may not fully satisfy the user department.

o User involvement is necessary in that the identification of the type of management information required by a department can be elusive. Requirements must be built in as the departmental procedure or function is automated. The difficulty arises when management officials may not be able to identify their needs, in some instances, because they do not have a clear perception of the alternatives. Further, thinking beyond existing traditions and practices is not easy. One successful technique is to conduct a "brainstorming" session with management officials and technicians to search out and identify new approaches that are now possible through manipulation of data by the computer.

Another process developed successfully by some USAC cities to obtain user involvement exploits a service bureau concept. Systems analysts serve as a link between the data processing operation and the user departments. The analysts may possess some technical skills, but their primary function is to become knowledgeable about a potential user department--how it operates, what its procedures are, the data it generates, how it relates to other departments, and so on. Asked to describe the criteria by which systems analysts are selected, one official replied: "Bright people who can think."

USAC also demonstrated the need to test thoroughly a system before it is placed in operation, particularly when the system is replacing or modifying an existing manual operation. The best procedure is to test the automated system parallel with the manual system. Unexpected problems and design flaws can be corrected without causing a disruption in the service.

Actually, there are two basic steps in the testing process. First, the developers of a system should determine through testing whether the system meets the design requirements. Second, the users should test the system to make certain they are confident it will meet their needs.

In one USAC city, the inability to test a component before putting the system into operation caused more than six months of trouble. In that instance, a water billing system was changed radically, and running parallel systems was not practical. Moreover, the user department was not confident that the new system would function properly. The result was several thousand billing errors.

Long-Range Plans

USAC has demonstrated that building an integrated system is an evolutionary, long-term process that should be addressed in incremental stages. The panel believes the best approach is to develop a long-range plan which identifies information needs, develops strategies and alternatives for meeting those needs, and establishes a time frame for achieving objectives.

Such a plan would:

- Provide a systematic process against which progress can be measured.

- Provide a framework for the local government as a whole, thus encouraging departments to take advantage of a mutually beneficial system.

- Provide for evaluation of the alternatives for systems development prior to initiation of the actual development activities.

- Offer greater management control over costs.

o Provide the taxpaying public with information on the benefits the investment is expected to provide.

o Provide for the rational expansion of computer capacity in relationship to need.

o Most important, components that are developed can be programmed to meet future needs, thereby reducing costly reprogramming that may occur when future requirements are not taken into account in the initial development.

The more concise reason may be: "If you haven't written it down, you haven't thought it through".

An idealized process for developing an IMIS on an incremental basis would require that each potential EDP application be examined and ranked in order of its value to the city. Each application should be examined in sufficient detail so that every element of data required for the implementation of approved programs could be entered into the data base in such form as to be available for each subsequent application when that application has been approved. Development should then begin with the most needed application, with each subsequent application being evaluated as an addition to the existing system.

While this idealized method may be unreachable in a practical working environment, a close approach to it holds promise of significant savings of time and tax dollars.

Walking through this basic sequence allows a governmental administration to judge such important considerations as:

o Whether its process for management and decision making is, in fact, adequate.

o What information is needed to support the management structure and how to get it.

o How the various departments which will be using the system can be brought early into the system design.

o How to control systems development costs.

o Perhaps most importantly, the need to change as experience and knowledge contribute to more complete understanding.

Organizational Responsibility for Computer Services

There is no single correct answer regarding where the responsibility should be assigned for EDP management and development. That depends upon the nature of the local government.

The function of the computer largely dictates where it should be located. If the computer serves only a single department, it would logically be located in that department, except under certain conditions. A local government which intends future expansion of an information system beyond one department should consider location of the computer facility in terms of its long-range needs. USAC has shown that if an information system is to serve many departments, control of that system should not be located in one of the user departments. Removing control of a facility after it has become entrenched in one department can cause unnecessary, disruptive problems.

As a general rule, the office responsible for directing and coordinating overall activities--be it mayor, county executive, city manager, or whatever--should assume organizational responsibility of a centralized EDP function. The successful operation of the system, including the implementation of new EDP applications, will only be as effective as the communications and coordination among the department heads who are users of the EDP services.

A centralized facility ideally would function as a service bureau, providing technical assistance and encouragement to individual departments for the benefit of all. It should be viewed entirely as a staff function in support of line agencies. It should not intrude on line agency responsibility. The responsibility for performance, whether related to utility bills, tax statements,vehicle fleet management, auto registration, tax administration, security, or fire prevention, rests with the appropriate department and not the service bureau.

Use of External Technical Assistance

In the development of computer information systems in the USAC Program, each USAC city was required to develop a consortium that included the city as the prime contractor and a systems development subcontractor. In addition, the USAC Program suggested that a university be a part of the consortium to serve as an independent monitor and to provide orientation and training.

This approach was rather severely criticized in most USAC cities in discussions between local officials and panel members. The officials said that the systems development contractor often had little experience in local government, extensive turnover of contractor staff affected continuity, and the objectives of city and the systems development staffs were not always consistent.

Another major weakness, the officials said, was the absence of a definitive agreement between the city and the subcontractor which outlined deliverable items and system accomplishments within a planned timetable.

These criticisms of USAC demonstrated a fundamental principle applicable to all local governments. The successful use of technical consultants requires that local government contract for clearly defined objectives and have the internal technical capability to manage and monitor the fulfillment of the contract.

Documentation

Some documentation--a set of written rules governing the manner in which data is put into and extracted from the system--is essential to assure the orderly functioning of an information system. Without an adequate set of rules, a system is likely to be dysfunctional or dependent upon those who designed it. Thus, documentation should be an integral part of the development process.

Documentation for management purposes involves describing the flow of information through the system, the inputs and outputs that result from the data flow, and a narrative description of the operations. At the designer level, documentation explicitly identifies the data that is to be captured and when, the files that are to be used, the details of how processing is to be done, the outputs to be generated by the system, and so on. As a result of the need for explicit detail, local governments have begun to recognize that the design of forms which yield data is an important consideration for the systems designer.

Although documentation methods may vary, one approach is to start with an overview and move to successive stages of specificity. Thus, the overview which serves management describes the operation of the entire system. At the systems design level, documentation is needed for modules or groups of programs that are closely knit together. The next stage, which is more explicit than the systems design level, describes the operation of a specific program. This involves the processing of program data, relating that data to existing files, updating those files, producing outputs, and the like.

The last level provides documentation for the user, indicating the purpose of each function and the procedural steps that are necessary to make it work.

CHAPTER 6

Costs and Benefits

LACK OF DATA

The panel found cost and benefit assessment virtually impossible because data is not available in the USAC cities. Although USAC cities have data on overall costs, data which shows benefits does not exist on individual modules or components within the system. Also, the costs of extensive research, documentation, and reporting carried out by the USAC cities, which increased USAC costs, need not be duplicated by local governments desiring to acquire similar systems.

In fact, the panel members heard considerable criticism voiced in all USAC cities concerning the amount of time required to respond to USAC administrative requirements. Estimates of time spent ran as high as 50 to 60 percent among top management staff. The requirements included meetings with consultants and USAC officials, preparing extensive documentation for the five phases each project went through, and, beginning mid-way through the program, frequent HUD requests for proposals for refunding. The city officials believe too much time was devoted to such activities and, as a consequence, prevented project management from providing essential leadership to systems development work.

On the basis of discussions with USAC city officials, the panel has concluded that the USAC Program cannot offer significant guidance to local governments to determine cost/benefit relationships of information systems.

The USAC cost factors are not meaningful because of the research element. In addition, the USAC Program did not attempt to quantify benefits or to measure the results that have been received. Moreover, some benefits will not be realized until the systems become more fully developed.

Some benefits defy quantification. A change that occurred in Dayton, Ohio, as a result of its USAC project is a good illustration. The director of Dayton's Office of Management and Budget (OMB) said the establishment of a financial management information system has had a profound effect upon the department. Previously, the OMB consisted

largely of accountants who handled budgets manually. The city's departmental budgets are now computerized as a part of the information system, freeing OMB to go to a management-by-objectives approach. The staff now includes persons with public administration and social science backgrounds who strengthen the city management function. This benefit was unpredictable and probably impossible to quantify monetarily.

COST/BENEFIT ANALYSIS

The panel believes that some data regarding costs and benefits are essential in order for local governments to decide whether or not to pursue an information system. In discussions with non-USAC city officials, and in some USAC meetings that were attended by panel members in which information systems were discussed, officials wanted to know the costs involved in different approaches and the results that could reasonably be expected. Cost/benefit information, to the extent it is available, would be an important factor for a local government to consider in deciding whether to develop information systems internally or to transfer them from another jurisdiction.

Cost savings achieved through transfer can be substantial. Minneapolis recently received a technology transfer grant from the Law Enforcement Assistance Administration of the Department of Justice to obtain a basic element in a police information system. After several months of looking at other systems, the Charlotte system was chosen because it was a computer-aided police dispatch system and because the hardware used by Charlotte was compatible with the computer being used by Minneapolis. Police officials estimate they saved substantial sums by transferring the Charlotte system rather than designing and developing a system of their own.

COST/BENEFIT CONSIDERATIONS

Beneficial results that can be clearly tied to computer use in a quantifiable way are sometimes difficult to pinpoint. One popular justification in recent years has been reduction in clerical staff for routine processing. Such reductions probably do no more than offset the total costs of computerized operations. James N. Danzinger, in an exploratory study of EDP operations in 12 cities, found that staff reductions as a result of computerization were largely mythical. "For most functions, it seems that there is no evidence of actual reduction of staff. In some cases, the number of staff has been constant while the number of transactions has increased. This, of course, is the equivalent of a staff reduction. In other cases, EDP has enabled the unit to expand the task or undertake new tasks." (9)

More importantly, staff displacement, taken alone, is not an adequate measure of a system's value. Computer technology has advanced beyond the replacement of clerical functions, and its value should be judged accordingly. But the process for making such judgment is not well defined.

A couple of examples of what panel members found in non-USAC cities may be illustrative. In one instance, a group of 10 cities* in the Minneapolis-St. Paul area wanted to develop a shared system. After visits to examine other systems, including one USAC city, they attempted a cost/benefit analysis. The costs of transferring a system were fairly easy to assess, but the benefits were not. Finally, the issue was resolved by testing the system in one city to observe the actual benefits. Satisfied with the results, the group acquired the shared system.

In another non-USAC city, Albuquerque, New Mexico, the panel found that the deciding factor for adding new systems was need, not cost-effectiveness. According to Albuquerque officials, the city's policy in considering new computer applications to its information systems is to search the literature and visit other cities to determine if computer applications exist that would meet their needs. They believe transferring in as many existing systems and programs as possible has saved considerable time and money. Albuquerque has more than 30 distinct municipal applications in its information system.

The panel found a couple of examples of cost/benefit analysis in non-USAC cities. Lane County, Oregon, attempted such a study in 1973. (10) To limit subjectivity, an enigma of benefit assessment, the study emphasized two points: 1) all costs associated with data processing were searched out, including additional management costs and other forms of overhead, floor space needed, special forms required, and education of end-users, and (2) the value received was assessed through a rigorous iterative process. In addition, those responsible for setting value received had to be willing to defend the figures before the county budget committee. Utilizing a series of data acquisition forms, Lane County sought to find out:

1) What is the total dollar value received from data processing?

2) What percentage of total computing resources is being devoted to the maintenance of existing systems, and what percentage is being spent on the development of new systems?

3) What will be the financial impact of those projects proposed for the coming fiscal year?

From the data, Lane County was able to make a cost/benefit analysis of its computerized information system. Using this approach,

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*The cities are Apple Valley, Brooklyn Center, Brooklyn Park, Coon Rapids, Crystal, Eden Prairie, Edina, Fridley, Golden Valley, and St. Louis Park.

Lane County found that for every $1.00 invested in its information system, it realized a return of $2.10.

Fairfax County, Virginia, made a cost/benefit study in connection with a decision on whether or not it should redesign and upgrade its Real Estate Data Base and Billing System, a component in its information system. (11) County officials considered a number of alternatives, which included continuing the existing system, making minor modifications to the existing system, redesigning parts of the system, or redesigning the entire system. For each alternative, quantified factors were considered. These included: anticipated problems; cost factors such as hardware, maintenance, and data conversion; the flexibility allowed by each alternative; what each alternative would do in the provision of assessment information, and the estimated savings by reducing clerical or other efforts. An effort was also made to comprehensively evaluate tangible and intangible costs and benefits in order to aid decision-making.

The study also sought to deal with user requirements, now and in the future. It dealt with capabilities currently required, but not included in the existing system, as well as additional capabilities of major consequence that might be needed in the future, such as automated reappraisal of property and composites of land records in title searches.

A POSSIBLE APPROACH TO COST/BENEFIT ANALYSIS

In searching for data pertaining to cost/benefit analysis, the panel often heard statements to the effect that such analysis cannot be done accurately and at a reasonable cost.

The panel believes that such statements only serve to delude both the management charged with the responsibility of making the decision and the public that provides the financial resources.

Some approximation of costs can be arrived at because, to do the work, people and computer time are involved. The only confusing variable is that of assigning appropriate overhead costs that may be involved. Nonetheless, a cost range can be determined and related to the benefits to be derived.

The panel recognizes that some benefits are impossible to quantify, such as those which relate to human life. But potential benefits can be listed, and some can be quantified. Those that cannot should be expressed in subjective terms, which may be a matter for public debate. Thus, cost/benefit decisions can be reached with public participation and support.

CHAPTER 7

Transferability

TECHNOLOGY TRANSFER

A basic premise of the USAC Program was that the systems developed in the test cities should be transferable, with minor modifications, to other governmental jurisdictions. The Request for Proposal stated:

> The common thrust which may be sensed throughout this entire statement of work is the theme of transferability, i.e. the ease with which solutions developed. . . may be transferred and implemented in other municipalities. It is understood that perfect transferability cannot be achieved because of the varieties of circumstances and structures of municipalities. However, there is sufficient commonality to suggest that in many instances the transfer of a prototype will require only minor modification. The key to transferability will, of course, include the avoidance of esoteric hardware, software languages, and systems design; avoidance of proprietary software; and rigorous insistence upon detailed and systematic documentation of all aspects of the prototype.

Understanding and taking advantage of technology transfer suffers from a certain vagueness of definition. What constitutes transfer of technology? Is it the actual adaptation of an existing system from Community X to Community Y? Or should it include something less, too, such as the transfer of an idea or a concept? Clearly, transfer rarely means that a system can be transferred from one place to another without some change.

The panel, after a number of discussions about the meaning of transfer, concluded that technology transfer should be viewed in its broadest context. Although there have been virtually no total systems transferred from USAC cities to other local governments, substantial experience that is the direct result of the USAC Program has been

utilized by numerous other governmental jurisdictions. The transfer of experience has come about through utilizing USAC ideas, concepts, or processes that proved workable, and avoiding USAC mistakes.

One test of transferability is whether the transfer will save time, or money, or both--as compared to independent development--for the receiving jurisdiction. On that basis, many USAC products are transferable--ideas, concepts, proven designs, flow charts, documentation, program increments, and so forth. Indeed, the idea of technology transfer at the local government level has been significantly stimulated by the USAC Program.

On the other hand, viewed more narrowly in terms of transfer of total systems or subsystems, the USAC Program's applicability is much more limited. The degree to which a computer-driven, operations-based information system can be transferred rests on the ease with which that system can be adapted to meet the needs of a recipient city. An integrated system designed for one city, in most instances, is not easily adapted to another city because of the interdependent nature of the components in an integrated system.

IMPEDIMENTS TO TRANSFER

There are two fundamental impediments to successful transfer between local governments. One is the operational differences of the two governments. State law or local ordinances, for example, may mandate certain operational procedures, or require keeping different data elements. These requirements may vary widely from locality to locality, or from state to state. Obviously, the differences must be reconciled through adaptation. The more differences there are, the more adaptation is required.

A second fundamental problem is computer configuration. Dissimilar hardware, naturally, requires reprogramming and file redesign. Somewhere in this transfer process, and it is not easy to determine where, extensive modification diminishes cost saving or other advantages, and transfer becomes impractical.

The panel found that, as a general rule, basic systems designed to meet operations of a common nature among governmental units were the easiest to transfer. As the systems become more complex and grow more dependent on other parts of the system for support, the more difficult the transfer becomes.

Along this line, the panel believes the USAC Program contained an inherent contradiction that inhibited transfers. USAC required that systems be integrated and tied to a centralized data base and, at the same time, be transferable. The former contradicts the simplicity which is the expedient for the latter. The same applies to system

increments. For example, Charlotte's Fire Operations Module, one of its earliest system increments, relies on a street address file to retrieve fire inspection data. The Charlotte Geographic Data Index Maintenance Module compiles street address data from a number of departments, including the fire department. Thus, a city wanting to transfer the Charlotte Fire Operations Module would need to transfer all or part of the index module, or provide a method for maintaining street addresses.

The panel believes that USAC's integrated approach was necessary, and that it has, as pointed out earlier, contributed extensively to the body of knowledge regarding how to develop an integrated system. By the same token, however, HUD officials should not be disappointed that the transfer of total USAC systems has not been extensive.

Nonetheless, the panel believes that the acquisition of information systems through some transfer that takes advantage of the experience of others is a workable approach. Whether it is an idea, a conceptual approach, a workable design, or even a proven computer program, local governments can profit from the successes and failures of others. The costs of a proven system are more readily defined and the benefits are more readily demonstrable.

THE PROCESS OF TRANSFER

The panel believes that more needs to be known about the process of transfer to make it attractive to more local governments. How should transfer be approached? What elements should be considered and what pitfalls avoided? The panel heard opinions expressed that transfer can best be made through some type of third-party arrangement. A consultant, vendor, or other independent entity with knowledge of computer technology serves as the link between the two points of transfer, particularly in situations in which the recipient local government may have insufficient technical personnel and is unfamiliar with systems development. Third-party assistance may be necessary because straight transfers between local governments can put a heavy burden on the staff of the local government from which the system is being transferred. Personnel from the "host" government often cannot spend the time required to effect the transfer to the point where the transferred system is trouble free.

But the panel also heard of instances in which third-party arrangements, due to a variety of factors, were not entirely successful. This led to two conclusions. First, an information systems resource center is needed to keep abreast of developments in local government information systems. Such a resource center should be a repository of successful applications of computer technology from which local governments could determine what alternatives are available.

Second, further research is needed on the transfer process. The research should seek to define the different approaches to transfer, the steps to be taken in each approach, and highlight some of the problems that might be encountered. (See the full list of recommen-

dations in Chapter 10). The panel believes a study of the transfer process would significantly increase the utilization of existing technology. Further, as information systems become more widespread, the transfer technique may become a principal means by which smaller local governments can acquire information systems.

CHAPTER 8

Intergovernmental Cooperation

DATA SHARING AMONG LOCAL GOVERNMENTS

The panel was requested to examine the extent to which the USAC systems are being utilized in an intergovernmental setting. To fulfill this task, the panel wanted to determine that other units of government were involved with the USAC cities in the planning and development of their information systems, to what extent data was being shared among separate governmental jurisdictions, and how the USAC systems relate to information systems at the state and federal levels.

With few exceptions, such as the sharing of crime data with state and federal data banks, the panel found little evidence that the USAC Program has had any impact on encouraging intergovernmental cooperation in the sharing of computer facilities or exchange of data.

These results may be due, at least in part, to the original scope of the USAC Program. Only municipalities were eligible for the program, and the Request for Proposal did not give strong emphasis to intergovernmental cooperation. The RFP stated:

> This project is designed to develop information systems to meet the specific needs of municipal jurisdictions. It is intended to improve the operational and decisional capabilities of local governments. Since the municipality serves as the instrumentality for coping with urban problems and achieving urban program objectives, municipal information systems are the building blocks of information systems of other levels and jurisdictions of government. It is from this basic system that information is generated for ultimate use in other jurisdictions.

Although this statement has some basic validity, it is inadquate in terms of total information flow essential to an integrated information system--a USAC objective. Cities, which the USAC program was limited to, generally do not perform certain functions, such as health and welfare services, or education, which are usually state-controlled and are typically operated either through county government or some other institution. Thus, a municipal information system that does not have some type of arrangement with other institutions

(e.g counties,public agencies, school boards) to get data on extraneous services cannot constitute, in any real sense, a totally integrated information system. None of the USAC cities has such an arrangement.

The panel found that in many instances officials in USAC cities recognized the potential benefits in exchanging data and the economy that could be achieved through the sharing of facilities with other jurisdictions. There was evidence that at the staff level cooperation was being achieved selectively between jurisdictions in a quiet, but effective way.

The principal barriers to active intergovernmental cooperation are largely political and jurisdictional rivalries that have existed for many years. In one city, the sharing of facilities was referred to as "co-locating" rather than consolidation, since the latter term seemed to raise many negative connotations. In this case, several attempts to consolidate the city and county governments have been turned down by the voters.

THE ADVANTAGES OF INTERGOVERNMENTAL COOPERATION

The flow of information acts as a nerve center and serves to integrate a variety of functions. Therefore, the panel concluded that the development of information systems affords an excellent opportunity for greater cooperation across jurisdictional lines on problems of common concern.

The benefits obtained from cooperative efforts, particularly in smaller jurisdictions, are substantial. One is cost saving. Information systems are complex and expensive. Sharing of facilities could possibly reduce the cost to an individual jurisdiction and, at the same time, provide more service for the community at large. Shared systems would negate the need for duplicative data. Further, they would allow the development of an indicator system that would give governmental officials a capacity to identify and react to potential multi-jurisdictional problems before they reach crisis proportion. A cooperative approach also would make better use of skilled personnel.

Finally, the panel believes that the development and utilization of information systems may foster greater intergovernmental cooperation at the local level. The U.S. Advisory Commission on Intergovernmental Relations noted in a report published in 1973 that the uneven distribution of needs and resources makes the central city, suburb, and rural community appear physically and psychologically separate entities. "Yet in terms of economic, educational, cultural, and recreational goods and services they all provide, all three types of jurisdictions long ago lost their claim to independence." (12)

The report further said that the costs of crime, air and water pollution, traffic congestion, and other problems that spill over individual local government boundaries have "focused attention on the desirability and feasibility of multi-jurisdictional remedial action."

Information systems, given the proper incentives for development, can help that remedial action.

CHAPTER 9

Information Access, Privacy, Security, and Confidentiality

AN OVERVIEW

As more local governments use computer technology to handle information needs, a set of corollary issues has emerged. The issues pertain generally to collecting only essential data about individuals and organizations, making certain the personal data that are collected and maintained are safeguarded, assuring that the system is available only to authorized persons, and assuring that the computer system is secure.*

Protection of sensitive data is not new to local governments. Data contained in manual files, such as juvenile court records, investigative police reports, and sales tax records traditionally have been protected through some type of locked file, and access has been restricted to authorized persons.

The computer, however, has intensified the problem. Computers are capable of storing vast quantities of data, with rapid cross-referencing and searching of sensitive data about individuals and organizations. Furthermore, data can be manipulated and combined from a variety of separate files, particularly where files are linked together in an integrated data base. The consequences for local governments are generally two-fold. First, extra caution must be exercized against collecting and maintaining non-essential data about persons. Second, local governments need to provide technical and procedural safeguards to prevent the commingling of data that can be used to harm a person if used improperly.

The restrictions imposed in guarding personal data and guaranteeing its confidentiality are somewhat at odds with other important responsibilities of government. They must be balanced against the duty of assuring access by the public to government, to government operations, and to information held by government--to assure that government is performing in the public interest. Striking the

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* A set of definitions associated with terms used in the discussion of privacy, security, and confidentiality are included at the end of this chapter.

proper balance between these conflicting goals is difficult to achieve and maintain. Moreover, the proper method of approaching the problem remains unresolved in many communities. Yet the panel was encouraged by its finding that two of the USAC cities--Charlotte and Wichita Falls---are among the country's leaders in taking steps to resolve these problems, and have done so in a similar manner.

The panel found several possible approaches to the problem. A jurisdiction could enact a local law on the subject, establish a a general policy of local government, require that each department of government establish its own policy, or decline to act and rely on state laws that have been enacted on the subject. Many communities have taken no action and many states likewise have not taken comprehensive action.

USAC required that each city develop a data access control plan, but did not specify the approach to be taken. Both Charlotte and Wichita Falls enacted local laws after giving considerable thought to the problem of law and policy development with respect to data access and privacy. Charlotte's legislation created a Municipal Information Review Board. Wichita Falls' law created a Data Access Advisory Board. Both laws are similar in that they seek to balance the conflicting concerns in privacy of and access to information, but the duties and powers of the two boards differ, and the scope of the Charlotte review board is broader.

Charlotte and Wichita Falls can be contrasted with Long Beach, which has not established a general law on the subject. The Long Beach Police Department, the principal information system user, indicated it has an internal policy manual on the subject. Beyond this local department policy, state law is the only source of policy development to meet the problem in this area. Fairfax County, Virginia, on the other hand, has established general policy guidelines which are binding on all departments of local governments. However, such policies do not carry the force of law. In the case of Fairfax County, the policies reflect a mature consideration of the problems and are backed by the supervisory administrative structure of county government.

NATURE OF THE PROBLEM

Privacy concerns the risk that record systems, which collect, hold, and use data about people, can lead to the abuse or misuse of data to the risk of the individual. In part, the problem is a natural outgrowth of the large population of the country, and, in part, the consequence of the complex social life that many individuals lead. A third factor involves citizen expectations of government, especially those segments of society which expect direct benefits from government. Collectively, such forces compel governments to collect data about people for the daily conduct of business, such as monitoring of social programs, law enforcement, and urban planning. Furthermore, natural resources will have to be managed more efficiently in the future, at every level of society. This implies careful management and careful planning, each of which can require additional data.

Underlying the privacy issue are fundamental questions of philosophy and social change. One position states that no organization has a right to data about an individual unless a genuine need exists because of legislation or for the granting of some privilege, benefit, or opportunity. A contrary position is that the individual with "nothing to hide" should permit personal data to be made available to any organization wanting it. This conflict of viewpoints is complicated by the basic struggle of contemporary society to achieve a proper balance with computer technology which is now pervasive throughout all strata of the socio-economic structure in the United States.

Although many of the privacy problems are not new, modern recordkeeping made possible by computer technology has intensified them. Manual record systems cannot be ignored in the privacy issue, but the computer-based systems are demanding the most attention.

Modern computer technology makes possible record keeping systems of unprecedented scope and scale. As a result, record practices that have been socially acceptable are now items of acute concern. Paradoxically, computer technology is an important aspect of a solution. It makes economically possible record keeping systems that are much tighter, such as:

- Access to the record system and its data is safeguarded by automatic password and authorization procedures.
- Dissemination of data is carefully controlled to authorized users.
- Surveillance of all data activity--changes, dissemination, updates--is monitored by automated logging and audit processes.
- Unauthorized copying of data is much more difficult.

In modern society, the individual is surrounded, influenced, and in some ways controlled by computer-based record systems. In most instances, persons do not have a legal right to control information held about them, and the question of data ownership is unclear. Organizations that hold records often behave as though the records are their property for use as they choose.

Frequently, the individual is in the position of having provided data for one purpose, and then finding it being used for a different purpose or, in some instances, being combined with data about him from other sources. Thus, a basic conflict exists between the need of government for personal data to support long-range planning and efficient management and the need of individuals and organizations to be protected against misuse of data and to have at least some control over its use. The individual is generally no match for state or local government in this contest, nor is there a satisfactory legal basis on

which to act.

Thus, the general thrust of legislation is to assure the individuals of certain privileges and rights concerning their records. The legislative remedies seek a better balance between an individual's personal privacy and the totality of record-keeping systems.

Access to and privacy of data banks have become important issues, partly because of changes in society, and partly because of legislative actions. For example, the Freedom of Information Act of 1966, which was amended in 1975, and the Federal Privacy Act of 1974 give the citizen extensive rights to examine and challenge records and to exert some control over the use of personal data in systems operated by federal agencies. At least four states have similar privacy legislation, and many others have laws dealing with freedom-of-information and limited right-to-privacy-issues.

The most extensive experience at a national level is in Sweden, which has had privacy legislation since mid-1973. The Swedish Data Act applies to all automated record systems in the country and is administered by a Data Inspectorate. The Inspectorate, which is chaired by a jurist, has full jurisdiction to license record systems, to issue regulations governing their operation, and to inspect them for compliance.

The State of Minnesota passed privacy legislation early in 1974, and amended the law in 1975. The Minnesota Act covers both manual and automated systems and is administered by the Commissioner of Administration. It applies only to computer systems run by the state and local governments.

For the most part, however, experience with privacy legislation in the United States is just beginning. Thus, many of the intricacies and possible complications that will arise from enforcement of data access and privacy legislation are still poorly perceived and not thoroughly understood. In the United States, legislation affecting record systems has imposed rules and constraints upon governmental sector, but not the private sector. The legislation is applicable to both manual and automated systems.

ELEMENTS OF A WELL DRAWN PLAN

A well drawn plan for assuring the privacy, security, and confidentiality of data should contain the following elements:

1. A provision for controlling the collection of data.

2. A plan for technical safeguards to keep data secure.

3. A plan for controlling access to data, including an individual's access to his record, and controlling, sharing, and cross-referencing with other records.

4. A plan to keep sensitive data confidential to protect both private and public interests.

5. A plan for assuring the integrity of the data.

Within each of these elements are a number of points that should be considered in the development of an information system. They are:

1. The plan for controlling the collection of data should establish standards which assure:

   - o Privacy and due process for the individual about whom data is collected.
   - o The surrender of data is not compulsory.
   - o Informed consent by the individual surrendering data.
   - o Confidentiality of data.
   - o If disclosure of data is required by law, assurance on non-disclosure beyond the extent required by law; advice to the individual of the extent of disclosure required by law, and the extent of disclosure in fact proposed prior to disclosure as minimal due process.

2. The plan for technical safeguards to keep data secure must start with an analysis of the threats against the system. Techniques for offsetting the threats include:

   - o Hardware safeguards such as memory protection and privileged mode of operation.
   - o Software safeguards such as file access controls, password protection, and audit trails.
   - o Procedural safeguards for such things as restart and recovery, preparation of backup files, and emergency procedures.
   - o Physical safeguards such as fire protection, personnel access control, locks, and television surveillance.
   - o Administrative and personnel safeguards such as control of personnel flow, assignment of personnel, and creation of a security control office.
   - o Communication safeguards such as encryption, physically hardened circuits, or use of packet networks.

3. A plan for providing access should include:

   - o Public notice of the nature and use of personal data.

- Public notice of the nature of computer systems and data banks.

- A provision to enforce individual rights of access to files.

- The provision for an individual to correct inaccurate data.

4. The plan to assure confidentiality of data should define the nature and scope of confidentiality of data by private and public interests.

5. The plan to maintain data integrity should insure:

   - Accuracy and reliability in identification of data entries to data subjects.

   - Correlation with accuracy by appropriate authentication methodology (of the subject with assigned file entries).

EMPHASIS OF PRIVACY LEGISLATION

Privacy is concerned primarily with the protection of individuals against harm that might occur as a result of misuse or abuse of personal data in some record system. Secondarily, it concerns the entire issue of what personal data may be collected and by whom. Current legislation emphasizes the first aspect, and thus, personal data can be divulged only to persons with a need to know.

Hence, the entire issue of computer security and the access control that it forces on users of a record system is essential in responding to privacy. The safeguards established within a record system are primarily intended to be effective against the malicious person who attempts to pirate something from the system, but assures divulgence of data only to authorized recipients. In contrast, the issue of privacy as to what personal data might be collected is largely a matter of specific legislation that creates legal deterrents against the misuse of personal data by either the organization itself, or any of its employees.

Since privacy laws generally permit an individual access to his record, special features need to be added to record systems beyond those necessary for computer security. Thus, privacy legislation will impact the technical and administrative aspects of a record system. The interface between security and privacy tends to occur at the level of the user of the record system. On the one hand, the user faces computer safeguards which control and monitor access to personal information which is necessary in the performance of an authorized job; and, on the other hand, the user is confronted by citizens who seek under privacy law to view their records, to challenge the contents, and to be assured that such records are used only in acceptable ways.

ASSESSMENT OF OPTIONS FOR LOCAL CONTROL OF PRIVACY, SECURITY, AND CONFIDENTIALITY

When privacy is assured through a policy statement, it is unlikely to have the force of law. Therefore, the penalties invoked for a breach are unlikely to be substantial. Moreover, an internal policy may not have much external visibility. From the point of view of the individual citizen, a jurisdiction might be seen as not attending to a substantial social issue, even though it has directed its attention to the matter, as in the case of Long Beach.

The panel questions the wisdom of an arrangement wherein the same department that is governed by a privacy policy is the enforcer of that policy. A possible hedge to this criticism would result if an interdepartmental steering group, with adequate citizen participation, monitored the enforcement and functioning of local government policy on privacy matters.

Another option is to enact a local ordinance that establishes not only rules for protecting privacy, but also the legal penalties for infraction. Such a local ordinance could also establish either an administrative board or a citizen's board to monitor the functioning of the ordinance and perhaps even to accept responsibility for critical decisions about the use of personal data. Charlotte and Wichita Falls are examples of this approach.

Charlotte, by local ordinance, provides for a citizens advisory board that is responsible for hearing complaints, monitoring the performance of city departments, and rendering decisions when a matter is in contest. The panel found this process to be effective. Also, the board serves as an informal forum at which privacy issues can be publicly debated. The approach in Wichita Falls, although less developed, is equally promising.

A third possibility is the delegation of authority from the federal or state level to a local jurisdiction. This possibility has yet to occur, but such authority might be delegated under the Privacy Act of 1974, especially when local jurisdictions are responsible for disbursing and managing federal assistance funds.

SPECIAL PROBLEMS – UNIVERSAL IDENTIFIER

The panel would be remiss in its treatment of the privacy subject without commenting on the related issue of the use of a Social Security Number (SSN) as a personal identifier.

There are two aspects that need to be distinguished. When individuals interact with a record system, they identify themselves to it. In order to show that they are who they purport to be, it is common to authenticate the asserted identification by asking for some fact known only to the record system and to the individual in question. The time-honored example of this identify-and-authenticate procedure is the one used by the banking system, in which the authenticator of the bank customer is the mother's maiden name.

In modern record systems that deal with large numbers of people, a

serious problem of assuring accurate identity exists. There have been some efforts to use a personal name plus date and place of birth as a unique identifier, but even under this circumstance, occasional instances of duplication occur. Clearly, other combinations of personal facts could collectively be used as unique, personal identifiers with different personal facts for authentication. Currently, the question of whether the United States should create a system of unique personal identifiers for its population has not been publicly debated, and hence no clear public position has been established.

Because a large part of the population is required by federal law to have an SSN, and because no prohibition exists in federal law against using the SSN for other purposes, it has become a de facto, quasi-standard identifier. Unfortunately, however, its role is obscured because the distinction between identification and authentication is not made. Typically, SSN's role in the interaction between an individual and a record system is one of authentication; a person is identified by name and the record system requests an SSN as authentication. For interactions between record systems, the SSN tends to become the primary and sole identifier with no authentication step involved. Since much of public concern centers on the linking of computerized data files from one record system with those of another, it is this last inter-system use that is of major importance.

If the SSN were used only to authenticate an interaction between an individual and a record system, little concern would be raised, assuming, of course, that the issue of linking files was separately controlled. However, if more than one record system associates the same authenticator with an individual who appears in both, the authenticator, e.g. the SSN, becomes an identifier for the purpose of linking separate files.

Thus, there is a delicate issue of how to accurately identify an individual to a record system, while preserving the desired control over linking of files among record systems. Unfortunately, no local government or state, to the panel's knowledge, has dealt satisfactorily with this problem.

The Privacy Act of 1974 puts some restrictions on the use of an SSN. Section VII provides that "it shall be unlawful for any federal, state, or local government agency to deny to any individual any right, benefit, or privilege provided by law because of such individual's refusal to disclose his Social Security Account Number." It further provides that "the provisions (of the previous quote) shall not apply with respect to any disclosure . . . required by federal statute or the disclosure of a Social Security Number to any federal, state, or local agency maintaining a system of records in existence and operating before January 1, 1975, if such disclosure was required under statute or regulation adopted prior to such date to verify the identity of an individual." It further provides that "any federal, state, or local agency which requests an individual to disclose his Social Security Account Number shall inform that individual whether that disclosure is mandatory or voluntary, by what statutory or other authority such

number is solicited, and what uses will be made of it."

With the phrase "verify the identity of an individual," the law in effect is speaking to authentication. Although there is a "grandfather" provision exempting systems that existed prior to January 1, 1975, it appears to apply only when the SSN is used in the authentication role. The consequences of the language in Section VII are not wholly clear, but certainly any local jurisdiction requesting an SSN will have to disclose the authority under which the number is solicited.

The present restrictions on the use of the SSN under the Privacy Act are the best stopgap measure until the broader issue of personal identification, authentication, and linking of files can be addressed. It remains to be seen what rule will be imposed on local jurisdictions by federal agencies, particularly when the SSN is used as an identifier for individuals enrolled in a social program supported by federal funds, but administered at the local level.

In any event, local governments would be well advised to become informed about the issues surrounding use of the SSN. This would include being aware of the possible consequences regarding the decisions in the use of the SSN, participating in state-level deliberations, and keeping the public informed of developments.

DEFINITIONS

For clarity of discussion, the following definitions were adopted by the panel for terms related to computer-based data access, privacy, security, and confidentiality.

1. Jurisdiction. A term for a municipality, county, incorporated area, town, or a combination of these which constitutes the unit of government which establishes the legal norms in its territory.

2. Privacy. (or personal privacy or information privacy). (1) The view that an individual (and by extension, a group of individuals, or an institution, or all of society) must be able to determine to what extent information about him (or them) is communicated to, or used by others; (2) the protection of an individual (and by extension, a group) against harm or damage occuring because information about him is held by an organization in a record system; (3) the protection of an individual (or class of individuals) against unwelcome, unfair, improper, or excessive collection or dissemination of information or data.

3. Organizational Privacy. The protection of data (typically in a computer-based system) for the use of one organization, or by such others as it may authorize, e.g. other individuals, organizations, agencies, or groups.

4. Confidentiality. (1) Status accorded to data indicating

that it is sensitive and needs to be protected against theft or improper use, and may be disseminated only to individuals or organizations authorized (or privileged) to have it; (2) by extension, status accorded to data that reflects an understood agreement between the person furnishing the data and the person or organization holding it that prescribes the protection to be provided and the dissemination and use to be permitted; (3) a legally recognized relation between certain individuals (e.g., lawyer-client) that privileges communication between them from disclosure in court. (Sometimes, confidential data is legally required to be given in exchange for some benefit, privilege, or opportunity; sometimes, it is voluntary given.)

5. Computer Security. The measures required to: (1) protect a computer-based system, including the hardware, personnel, and data against deliberate or accidental damage from a defined threat; (2) protect the system against denial-of-use by its rightful owner; (3) protect data and/or programs and/or system privileges against divulgence to or use by unauthorized persons.

6. Data Security. The safety of data from accidental or intentional but unauthorized disclosure, modification, or destruction.

7. Data Integrity. The property of being what a data element is thought to be and therefore true and correct.

CHAPTER 10

Recommendations

1. Development and improvement of computer-based information systems by local governments will continue over the next several years.

> Therefore, some process or mechanism, such as an information systems resource center, needs to be organized and directed toward an analysis of existing approaches to information system development and that information should be available to interested local governments. Ideally, the center would provide information such as software, flow charts and diagrams, and data base management systems suitable for transfer or acquisition in order to give local governments the range of alternatives that may best fulfill their needs and requirements.

The panel concludes that, although the use of computers is widespread among local governments, no central organization exists from which local governments can obtain assistance in determining alternative computer-based information systems available to them. The exchange that does take place is informal and dispersed both in geography and time. No persisting records of experiences (both good and bad) is maintained, and no core of expertise is developed. The panel considers these to be significant problems that restrict the orderly development of information systems at the local level.

Because of the inherent advantages--such as reduced cost and proven workability--transfer of information system ideas, concepts, techniques, and even programs is likely to increase among local governments in the foreseeable future. In the panel's opinion, however, the transfer process will be limited and disorganized unless some focal point for assistance, such as the information systems resource center, is established.

2. Some local governments, especially intermediate and smaller size units, may need general assistance and stimulation in assessing what approach they can take in acquiring computer technology.

Therefore, in conjunction with Recommendation 1, a national transfer and systems development capability needs to be established to provide seminars and workshops and to offer continuing general assistance to local governments in information systems development.

Although Recommendations 1 and 2 appear somewhat similar, there are important differences. The function of the resource center under No. 1 would be to assemble and stay abreast of the vast and rapidly changing body of knowledge that is being generated regarding innovative use of data processing and information systems in local government. The body of knowledge, when accumulated, would be available on a centralized basis to local governments generally. The distinction between the two recommendations is that not all local governments are alike in their capacity to understand and utilize computer technology. Thus, a resource center needs to have the capability to inform and assist those local governments which have an interest in acquiring some systems capability, but do not know how to proceed, or are likely to take steps that have proven unsatisfactory, or unworkable elsewhere.

3. A basic problem that adversely affects the development of information systems is the differing perceptions and understandings between the designers and the users of the system--the elected officials, managers and department heads.

Therefore, there needs to be an education program to bridge the gap between these two important elements in information system development. The continuing education program could acquaint non-technical management and policy making officials with data processing resources, and conversely, data systems people with the political and managerial functions of government.

This recommendation stems from the generally recognized problem that exists in the application of technology to meet non-technological problems. The panel believes intensive training courses and seminars under contract from the Information Systems Resource Center (discussed under No. 1 and No. 2 above), could make the application of computer technology more effective in local government operation and management.

4. The transfer of proven computer-based applications appears to be an increasingly attractive technique by which many local governments can acquire information systems. Local governments are recognizing that information systems are a means to achieving greater management efficiency in the face of declining resources. In addition, the variety of systems that exist in local government has increased substantially over the past few years. If modifications can be minimized, transfer of software can result in considerable cost savings compared to developing software independently. The process of transfer of information systems, however, is not well-documented and understood.

Although enough successful transfers have taken place to demonstrate the validity of that approach, none of the transfers, to the knowledge of the panel, has been documented in such a way as to be of value to other local governments desiring to follow a similar course. Also, transfer can be a complex operation because of the many combinations that are possible. Thus, if the development of information systems by transfer of computer technology is to be effective, more needs to be known about the processs of transfer.

> Therefore, funding should be provided for a series of documented and monitored transfer experiments. The experiences should identify and record successful, as well as unsuccessful transfer processes. Model transfer agreements or contracts which could be widely used by local governments might also be developed.

The results of such experiences would be of invaluable assistance to the proposed resource center in carrying out its responsibilities.

5. Analysis of the costs and benefits of information systems in the cities visited by the panel members was poorly documented or nonexistent. Further, such analyses were viewed as being impractical tasks. This situation will not be long endured by the tax-paying public.

> Therefore, any future federally-funded program in this field should require the development of analysis procedures which would provide the decision-makers with a structured means for weighing costs against benefits, both quantitative and qualitative. In addition, the study should determine the transaction volume levels and other factors necessary to support specific applications.

Before making any financial commitments to develop an information system, local governments want to know the costs and the benefits they can expect. Evidence of how some units have undertaken cost/ benefit analysis is presented in Chapter 6. The subject needs intensive study to develop analytical measures and to identify levels of effort, such as volume of transactions, necessary to justify specific computer programs and specific hardware configurations.

6. The ability of the computer to collect, store, and retrieve large amounts of data, including sensitive personal data, has raised new problems for governments in protecting personal privacy, and in maintaining security and confidentiality of personal data that is a necessary part of a local government information system. Moreover, problems are being experienced in establishing satisfactory policies on access to information held in government data banks. The panel concludes that the access and privacy issues will be of increasing

concern to local governments.

> Therefore, the information systems resource center should prepare background information on mechanisms available to the local jurisdiction for accommodating the access and privacy issues as they are seen to be developing at federal, state and local levels; and provide guidance regarding technical protective measures that should be included in any well-designed data system. In addition, a model local ordinance should be developed that would attempt to reconcile the inherent conflicts that exist in implementing the Freedom of Information Act and the Privacy Act provisions.

Finally, appropriate federal agencies could encourage progress in solving such problems by requiring a systems component and local policy or law for handling these problems. These stipulations could be required in using federal resources to develop or expand a computer-based municipal information system.

7. The exchange of data and the sharing of computer facilities among units of local government is not widespread. Yet, the potential is enormous for cost saving, and for providing a more cooperative approach to solving problems of mutual concern.

> Therefore, the federal and state governments should establish an incentive program for intergovernmental cooperation in conjunction with the use of federal resources to develop or improve information systems.

As stated in Chapter 8, the efforts to develop joint or regional information systems are far below what could be achieved. The panel believes that the best approach to overcome the problem is by incentives to encourage mutual cooperation in areas where collaboration among contiguous units of local government is likely to succeed. Specific requirements for mandated cooperation, on the other hand, are less likely to achieve the result desired.

Notes

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4. Eberhardt Rechtin, Information Networks. This paper is one of a number of working papers submitted to the Panel on Technology for Metro Communications of the Committee on Telecommunications, April 2, 1975.

5. Joel E. Ross, Management by Information System, p. 107.

6. The Charlotte IMIS Project Completion Report, p. 7-5, USAC-CNCO-0209, the Department of Housing and Urban Development, October, 1975.

7. Donald Nolan, The Fresno City Experience in Transfer of Translation of a Financial Information System Using USAC Terminology. This paper was presented at the annual meeting of the Urban and Regional Information Systems Association, August 1975, in Seattle, Washington.

8. Robert W. Holmes, Information System Review For Senior Management, Financial Executive, April, 1969, p.56.

9. James N. Danzinger, Computers, Local Governments, and the Litany to EDP, (WP-75-01), Public Policy Research Organization, University of California at Irvine, Irvine, Calif., March, 1975.

10. Randall L. Stickford and Lenny C. Martin, Data Processing Analysis of Costs, Benefits, and Resource Allocations, Lane County, (Ore.) Management Report, February 1973.

11. This analysis is available through the National Technical Information Service. (NTIS ACCESSION Number PB242600/AS. Cost: Papercopy, $5.75, microfiche, $2.25)

12. U.S. Advisory Commission on Intergovernmental Relations, Substate Regionalism and the Federal System, Volume I, Regional Decision Making: New Strategies for Substate Districts, (U.S. Government Printing Office, 1973). p.9.

Study Methodology

The USAC Support Panel divided its work into four segments according to the assignments given to it by the Department of Housing and Urban Development. Those four assignments were:

1. Assess the cost/benefit aspects of the information-communications systems and subsystems in the USAC Program.

2. Review the privacy, security, confidentiality, and information access aspects of the program and identify the major issues raised by computerized information systems.

3. Explore actions that might be taken by HUD and the other federal agency members of USAC to ensure maximum knowledge and transferability of the USAC concepts.

4. Assess the use of information systems across jurisdictional boundaries.

The panel held a total of five general meetings. The initial meetings were devoted to defining the scope of the study and to receiving briefings from HUD and city officials on the operation of the USAC Program.

Although the panel functioned as a committee of the whole throughout, at the second meeting the members were assigned to subgroups according to the four tasks outlined above. From the briefings and materials supplied to the panel, the four subgroups formulated issue papers which identified key questions to be answered during the site visits to the USAC cities. At the third meeting, the questions were reviewed and finalized. The questions were used as a framework to provide guidance and coordination for the site visits which followed the third general meeting. Each city received a copy of the questions prior to the site visits.

In most instances, each panel member visited at least two USAC cities. During the site visits, discussions were held with elected officials, city managers and their immediate staffs, departments heads, and data processing personnel. The site visits were supplemented by trips to other non-USAC local governments. These trips were made by individual panel members or small groups.

After each visit, confidential trip reports were prepared for the use of the entire panel. The full panel met again after completion of the site visits to discuss the results of each visit, to synthesize its findings, and to prepare its recommendations to the sponsoring agency. The group prepared an outline for the final report and members submitted written comments to be incorporated into the final document. The final meeting completed the report and the list of recommendations.